Management Directions for the National Forests of the Greater Yellowstone Ecosystem

A Report Prepared by

THE WILDERNESS SOCIETY

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MANAGEMENT DIRECTIONS FOR THE NATIONAL FORESTS OF THE GREATER YELLOWSTONE ECOSYSTEM

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The Wilderness Society

Cover Photo: Gros Ventre Wilderness Area, Bridger-Teton National Forest (Phil Hocker)

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FOREWORD

Our 191 million-acre National Forest System is wonderfully rich and diverse, containing some of the greatest natural bounty on earth. Certainly no other part of the system surpasses the beauty and grandeur of the national forests located within the region we describe here as the Greater Yellowstone Ecosystem.

For this region, as for the system as a whole, The Wilderness Society encourages a new vision for the future. Our vision is based on a management philosophy that emphasizes natural or near-natural conditions where biological diversity flourishes and large intact ecosystems are maintained. This management approach gives precedence to watershed protection, outdoor recreation, and biological diversity over resource development; where commercial development occurs, it does not degrade other forest resources.

Nowhere are such principles more important than for the Beaverhead, Bridger-Teton, Caribou, Custer, Gallatin, Shoshone, and Targhee National Forests, constituting approximately three-fourths of the Greater Yellowstone Ecosystem. Past, present, and future actions on these forests will determine the quality and integrity of this unique ecosystem.

For these reasons, The Wilderness Society is focusing special attention on the long-range management plans for the national forests within the ecosystem. In 1985, TWS assembled a team of staff members and consultants with expertise in forestry, economics, and ecology to analyze the U.S. Forest Service's land and resource management plans for the national forests within the ecosystem. The team members are identified in an appendix to this report.

We are pleased to be a part of the excellent conservation efforts of the Greater Yellowstone Coalition, Jackson Hole Alliance for Responsible Planning, and other groups and individuals. The combined analytical and organizational resources brought to bear on preservation of the Greater Yellowstone Ecosystem represent a truly impressive citizen action. The findings and recommendations summarized in this report were prepared to further inform the public of significant threats to the ecosystem and to urge a new direction for the management of the national forests in the Greater Yellowstone region.

Barry R. Flamm

Barry Flamm
Chief Forester

INTRODUCTION

The Yellowstone of tomorrow is being decided today. In late 1986, the U.S. Forest Service issued the last of seven long-range management plans that will largely determine the fate of the Greater Yellowstone Ecosystem. Together, these plans present the Forest Service's management prescriptions for the future of the national forest lands that constitute more than three-quarters of the ecosystem's public land base.

The Wilderness Society has examined the seven Forest Service plans for the Yellowstone area. This report presents The Society's analysis of the plans together with management recommendations based on our vision of the appropriate role of national forests in the ecosystem.

National Forests of the Greater Yellowstone Ecosystem

The Greater Yellowstone Ecosystem includes all or parts of seven national forests -- the Beaverhead, Bridger-Teton, Caribou, Custer, Gallatin, Shoshone, and Targhee. The seven national forests in the ecosystem total approximately 10 million acres, or 77 percent of the ecosystem's total public land base of 13 million acres. The remainder of the ecosystem consists of Yellowstone and Grand Teton National Parks, three national wildlife refuges, and a small amount of other federal, Indian, and private lands (see Map 1, centerfold).

Unlike the national parks, which form the core of the ecosystem, most of the national forest land is available for commercial extraction of resources such as minerals and timber. In recent decades, the Forest Service has built hundreds of miles of roads and clearcut thousands of acres on the ecosystem forests. The consequences of commodity development have often been long-term degradation of the scenic, recreational, watershed, geological, and biological resources that have made the Yellowstone area internationally famous.

Forest Planning

Congress passed the National Forest Management Act of 1976 (NFMA) in an effort to redirect Forest Service resource priorities and to correct land management abuses on national forests in the Yellowstone area and elsewhere in the country. One of the chief critics of the Forest Service, Senator Gale McGee of Wyoming, made the following observations of clearcutting on the Bridger-Teton National Forest:

> The consequences were visibly in evidence, runoffs producing erosion, clouded streams that once were sparklingly clear, whole mountainsides laid bare. And some of those mountainsides, I may add, according to Forest

> Service personnel with me, had been replanted two and three times in the last 10 or so years, and still no reforestation (U.S. Senate, 1971).

Senator McGee described the visual results of timber cutting on unsuitable land saying, "It looked as if a squadron of B-52s had ravaged the pristine beauty of the Wind River Mountains."

The NFMA directed the Forest Service to develop long-range management plans for each national forest. The forest plans were seen as the means to ensure that clearcutting and other commodity uses did not overshadow or degrade ecological and aesthetic values. The importance of non-commodity benefits to the well being of people, wildlife, and ecological integrity was thus recognized by law.

In the Greater Yellowstone Ecosystem, forest plans are in various stages of development and implementation. Final plans for the Targhee and Caribou were released in October 1985 and have been appealed. The Beaverhead and Shoshone final plans, released in early 1986, were also appealed. The Custer final plan was released in December 1986. The draft plan for the Gallatin National Forest was released in March 1985, but the final plan has been delayed. Finally, the Bridger-Teton draft plan was released in October 1986, and the final plan is expected in the latter half of 1987.

A Vision for the Ecosystem

Based on our analysis of the Forest Service's draft and final plans, it is evident that the agency has not lived up to Congress' mandate in the NFMA. Extensive timbering and roading are proposed, often in environmentally sensitive and economically marginal areas of the ecosystem. Far more roadless land is proposed for development than for preservation as wilderness. Overall, the outlook is for continued fragmentation of the ecosystem, loss of biological diversity, and destruction of recreational values. Moreover, the proposed timber and roading programs -- the source of most environmental impacts -- will result in millions of dollars in losses to the federal government.

This report proposes a different vision of the future and an alternative management direction for the national forests of the ecosystem. Under this vision, commodity resource exploitation plays a secondary role to wildland resource conservation. The general trend toward habitat degradation and fragmentation is halted and even reversed through active restoration of damaged areas. Curtailment of uneconomic logging has positive effects on both the federal budget and the regional tourism economy. Based on the analysis contained in this report, it is evident that environmental protection and resource stewardship are essential elements of sound economic policy in the Yellowstone region.

While national forest lands constitute most of the Greater Yellowstone Ecosystem, management on other public and private lands in the ecosystem also warrants careful attention. For example, the fate of the grizzly bear will depend in part on actions taken to reduce bear mortality at Fishing Bridge Campground in Yellowstone National Park and other locations outside the national forests. Such management decisions are beyond the scope of this report and need to be considered further in the context of the entire ecosystem. In addition, future management direction on the national forests will necessarily need to change in response to new biological and economic information about the ecosystem and the region. Thus, the analysis and recommendations contained in this report do not constitute The Wilderness Society's final statement on the Yellowstone ecosystem.

The report is organized in three sections, covering major biological, economic, and resource management concerns. The first section addresses the issue of biological diversity from an ecosystem perspective, with particular attention to opportunities for building a macroreserve, designating wilderness areas, and conserving imperiled species. The second section analyzes changes in the regional economy and imbalances in Forest Service budget priorities. The third section examines the role of extractive industries in the ecosystem's national forests. The concluding section summarizes the report's proposed management directions.

BIOLOGICAL DIVERSITY AND ECOSYSTEM MANAGEMENT

With its great predators like the grizzly bear and mountain lion, its herds of grazing mammals, and its rich assortment of plants, animals, and natural communities, the Greater Yellowstone Ecosystem is a priceless reminder of what western North America was like just two centuries ago, before the arrival of European settlers. Not only does the ecosystem preserve a tremendous array of species, it also preserves ecological processes -- the complex web of interactions that occur between species and their environments. Indeed, this area represents one of the last regions of the country where these ecological processes operate much as they did before human interference. Thus, the overriding goal of land managers must be to protect and maintain the ecological integrity of this remarkable region.

To accomplish this goal, strong action must be taken on six fronts:

- Prevention of habitat destruction and fragmentation.
- Protection of critical wild areas and rare natural communities.
- Recovery of imperiled species.
- Development of new policies regarding vegetative manipulation.
- Restoration of degraded areas within the ecosystem.
- Analysis of ecosystem-wide cumulative effects.

Habitat Degradation and Fragmentation

One of the most profound developments in the application of conservation biology to land management has been the realization that virtually all natural habitats are destined to resemble islands in that they will eventually become smaller, more isolated fragments of what was once a much larger natural landscape (Wilcox, 1980). One has only to fly over the heavily logged Mount Leidy Highlands or see the clearcuts extending to the boundaries of Yellowstone National Park to realize that the fragmentation and degradation of the Greater Yellowstone Ecosystem is already underway (see photograph, page 6). Indeed, the gradual erosion of the natural landscape is probably the greatest long-term threat to the biological diversity of the region.

Activities such as logging, road construction, mining, and oil and gas exploration are all part of the fragmentation process. Their net effect is to endanger populations of plants and animals and to disrupt the natural processes so important to the functioning of the ecosystem.

Habitat fragmentation caused by clearcut logging and roadbuilding in the Mount Leidy Highlands, Bridger-Teton National Forest. (Barry Flamm)

Land-use planning in the ecosystem must allow for long-term viable populations of species that require large expanses of relatively undisturbed habitat (for example, the grizzly bear, wolverine, and mountain lion). The Yellowstone region has an unusually rich assortment of such species, all of which have experienced alarming declines in their habitat. Planners must also allow for natural disturbances--especially fire--that are so important to the functioning of the ecosystem (Houston, 1973).

Building a Macroreserve

The best way to preserve both the biota and the ecological processes of the ecosystem over the long-term is to provide large expanses of contiguous wild areas. Fortunately, in the Greater Yellowstone Ecosystem an opportunity exists to link together critical wildlands, thus building a macroreserve. Creation of this macroreserve may be essential to the long-term health of the ecosystem. It will also enhance hunting, fishing, and other recreation activities that are so important to the economy of the region.

The opportunity to create a macroreserve within the ecosystem will not last forever. Plans must be implemented that will preserve existing "linkages" between wild areas and restore linkages that have been severed by resource exploitation activities. Below, we detail specific management decisions needed to accomplish this goal (for a visual display of the macroreserve concept, (see Map 2, Appendix C).

- The Mount Leidy Highlands area must be closed to all timber harvesting and energy exploration. Existing roadless areas must be protected and existing roads must be obliterated or closed to motorized traffic. This

action would connect the Teton and Washakie Wilderness Areas with the Gros Ventre Wilderness and roadless areas in the Salt River and Wyoming Ranges.

- Roadless areas in the Upper Green River must be protected from timber cutting and energy exploration. Some restoration in developed areas should also be undertaken in order to complete the linkage between the Gros Ventre and Bridger Wilderness Areas.

- Roadless areas in the Salt River and northern Wyoming ranges must not become fragmented or severed from the rest of the macroreserve. Management proposals must be carefully scrutinized to ensure that the area's ecological integrity is fully maintained.

- The four separate units of the Lee Metcalf Wilderness Area should be joined to each other and to Yellowstone Park by designating the Gallatin Range and Cowboy Heaven roadless areas as wilderness.

The end result of these management decisions would be a macroreserve extending from the northern end of the Madison Range to the eastern edge of the Absarokas, through Yellowstone and Grand Teton National Parks, and south into the Salt River and Wind River ranges. The macroreserve would be the largest expanse of protected land in the conterminous United States and a magnificent showpiece for this nation's commitment to the conservation of biological diversity. Moreover, important cover habitat and migration routes for big game and other wildlife would be protected, thereby enhancing the resource base for the region's growing recreation economy. The Forest Service should promptly implement the management decisions outlined above to build a macroreserve within the Greater Yellowstone Ecosystem and reverse the deterioration of this region's biological resources.

Wilderness

One of the most important qualities of the Yellowstone Ecosystem is its wildness -- the fact that one species, Homo sapiens, does not dominate the landscape as it does in so many other places. It follows that roadless wild areas are an especially valuable resource, and their protection throughout the ecosystem must be a high priority. As Edward O. Wilson (1984) has noted:

> We are reminded that the once mighty wilderness has shriveled into timber leases and threatened nature reserves. We measure it in hectares and count the species it contains, knowing that each day something vital is slipping another notch down the ratchet, a million year history is fading from sight.

Wilderness recommendations are a key element of the forest plans in most of the ecosystem's national forests. Federal law requires the Forest Service to evaluate the wilderness potential of all roadless areas in the forest plans, unless Congress declares otherwise. The Wyoming Wilderness Act of 1984 designated as wilderness 142,238 acres on the Shoshone National Forest and 350,996 acres on the Bridger-Teton National Forest. Congress "released" the remaining roadless areas on these two national forests from evaluation as wilderness in the current forest plans. However, Congress has not yet passed statewide wilderness legislation for national forests in Idaho and Montana. Thus, the plans for the Gallatin, Custer, Targhee, and Caribou National Forests all evaluate roadless areas in the Greater Yellowstone Ecosystem for congressional wilderness designation.

The Wilderness Society and other conservationists have proposed wilderness designation for 736,560 acres of key roadless areas currently under review in the ecosystem's national forests in Idaho and Montana. These areas are listed in Table 1, page 9, and delineated on Map 2, Appendix C. Adding such critical areas as the Gallatin Range, Cowboy Heaven, Palisades, and Bear Creek to the wilderness system will contribute greatly to the long-term integrity of the ecosystem.

Without exception, the Forest Service's wilderness recommendations for each national forest are grossly inadequate. As Table 1 shows, the forest plans recommend nonwilderness management for the vast majority of conservationists' wilderness area proposals. For example, the Gallatin draft plan recommends nonwilderness for the entire Gallatin Range--an essential wildland linkage in the ecosystem. In total, the Forest Service recommends wilderness for less than eight percent of the areas proposed by conservationists.

The Forest Service should reassess its position on wilderness designations in the ecosystem and recognize that wilderness provides the best insurance for conserving the ecosystem's natural diversity. All of the 736,560 acres proposed by conservationists should be recommended for wilderness designation.

Research Natural Areas and Special Interest Areas

The Greater Yellowstone Ecosystem harbors a number of rare natural communities and unusually fine examples of more widespread plant communities. These special places should be protected as Research Natural Areas (RNAs) or Special Interest Areas (SIAs). Unfortunately, some of them (for example, Wapiti Ridge on the Shoshone National Forest and Horse Creek on the Bridger-Teton National Forest) have yet to receive such protection. The Forest Service has been generally slow to identify and protect potential RNAs and SIAs throughout the ecosystem. For example, the 3.4 million-acre Bridger-Teton National Forest contains no RNAs or botanical SIAs. Efforts to establish RNAs and SIAs must be intensified before important areas are lost to development.

TABLE 1: CONSERVATIONIST AND FOREST SERVICE WILDERNESS RECOMMENDATIONS ON NATIONAL FOREST ROADLESS AREAS IN THE GREATER YELLOWSTONE ECOSYSTEM.

Roadless Areas	Wilderness Recommendations	
	Conservationist Proposals	Forest Service Proposals
	(acres)	
Targhee National Forest		
Winegar Hole	4,000	4,000
Lionhead	16,860	16,860
Palisades	111,000	0
Garns Mountain	78,000	0
Subtotal	209,860	20,860
Caribou National Forest		
Bear Creek	107,000	0
Caribou Mountain	89,000	0
Subtotal	196,000	0
Gallatin National Forest		
Cowboy Heaven	30,000	0
Gallatin Range	200,000	0
Lionhead	30,200	30,200
Reef-Republic	2,400	500
Absaroka-Beartooth Additions	40,000	0
Subtotal	302,600	30,700
Custer National Forest		
Line Creek Plateau	20,700	0
Burnt Mountain	5,000	4,200
Absaroka-Beartooth Additions	2,400	1,950
Subtotal	28,100	6,150
TOTAL	736,560	57,710

Protecting Imperiled Species

Several species within the Greater Yellowstone Ecosystem have either been extirpated or greatly reduced in numbers. The prompt recovery of these species is one of the most important and difficult challenges facing land managers in the region. This section focuses on two imperiled species -- the grizzly bear and gray wolf. Because it utilizes a wide variety of habitats and requires large expanses of wildlands, the grizzly is an excellent barometer of the health of the ecosystem. The wolf is highlighted because it was once the dominant predator of large ungulates in the ecosystem.

Grizzly Bear

Grizzlies once occupied most of the American West, ranging from Alaska south into Mexico and from California east to the Missouri River. As the wildlands of the West diminished, the great bear retreated. Today, only two significant populations of grizzly bears remain in the United States outside of Alaska. The Greater Yellowstone population is one of those.

No one knows precisely how many grizzlies remain in the Yellowstone region. Best estimates place the number somewhere between 200 to 300 individuals. In recent years, the steady loss of bears, especially adult females, has heightened concern for the future of this population (Knight and Eberhardt, 1985; USFWS, 1982). Strong action must be taken now to ensure that this fragile population will recover and that the grizzly bear will continue to roam the ecosystem. Moreover, it must be recognized that Yellowstone National Park by itself is simply too small to sustain a viable, wild population of grizzlies. National forest lands are essential to the survival of the species.

Historically, the major threats to the grizzly have been excessive human-caused mortality and the loss of suitable habitat. Grizzlies in the Yellowstone region have been killed by poachers and ranchers, and their habitat has been lost to commercial development, timber harvesting, and energy exploration. Because these are ecosystem-wide problems, coordinated management of the public lands is essential. This is particularly true for the national forests, which fall under the jurisdiction of three Forest Service administrative regions.

At present, grizzly management on the national forests is based on a habitat classification scheme. Areas deemed essential to the recovery of the bear are classified as Situation 1; areas that may harbor bears, but which are not considered essential for recovery, are classified as Situation 2. Situation 2 habitat also includes areas where the importance of the habitat for grizzly recovery has yet to be determined. Given that there is but one population of grizzlies in the ecosystem, one might expect the national forests that harbor them to follow similar directions with respect to grizzly conservation. However, the

forest plans vary widely in their management directions for grizzly habitat.

The Bridger-Teton National Forest -- which probably has the best guidelines for grizzly bear protection in its draft plan -- nonetheless permits unscheduled timber harvesting on land classified as Situation 1. While new mineral leases apparently will not be allowed in Situation 1 habitat, existing leases may be developed on a case-by-case basis. Exploration and development will also be allowed up to the boundaries of Situation 1 habitat. The Bridger-Teton currently has no sheep allotments in Situation 1 habitat; however, such allotments are not explicitly prohibited.

The Shoshone National Forest final plan permits energy exploration along the perimeter of Situation 1 habitat and up to one-half mile inside such areas (with a no-surface-occupancy stipulation). Road construction and timber harvesting are allowed in Situation 1 habitat. There are sheep allotments in Situation 2 habitat but not in Situation 1 habitat.

Both the Gallatin National Forest draft plan and the Targhee National Forest final plan allow energy exploration and development, timber harvesting, and sheep grazing in Situation 1 grizzly habitat.

The current plans do not provide adequate protection for the grizzly bear. There are serious flaws in the habitat classification system and the way it is being implemented on the national forests. When dealing with a population as vulnerable to extinction as the Yellowstone grizzly, the loss of additional habitat within its current range should not be tolerated. Yet this is precisely what is occurring under the current habitat classification system. Management guidelines for the grizzly should be uniform throughout occupied bear habitat, which we define as the area delineated by Knight and Eberhardt (1985) where grizzly bears are "seen commonly" (see Map 3, Appendix C). This includes areas of both Situation 1 and Situation 2 habitat.

To ensure the survival of the Yellowstone grizzly bear, the following recommendations should be adopted for all of the national forests in the ecosystem that harbor grizzlies:

- For a ten-year period commencing immediately, no commercial timber harvesting or energy exploration and development should be allowed in occupied grizzly bear habitat or generally within two miles of occupied habitat. The two-mile buffer is necessary to ensure that development activities adjacent to occupied habitat do not displace bears from the periphery of occupied habitat. In places where vegetation manipulation is essential to maintain suitable grizzly habitat, controlled burning should be used instead of commercial logging. At the end of ten years, this policy would be reviewed in light of the status of the grizzly population in the ecosystem at that time.

- No sheep grazing should be allowed in occupied grizzly bear habitat, since the entire historical record of the region demonstrates that sheep and grizzly bears are not compatible. Vacant livestock allotments should be restocked only where grazing is compatible with grizzly habitat requirements.

- Additional large recreation facilities or major expansions of existing facilities should not be allowed in occupied grizzly bear habitat. In particular, the Forest Service should not approve the proposed Ski Yellowstone development on the Gallatin National Forest.

- The Forest Service should make a strong commitment to acquire all private inholdings in occupied habitat.

- The Forest Service should aggressively and uniformly enforce regulations designed to prevent unnecessary human-caused bear mortalities.

Gray Wolf

The gray wolf is gone from the ecosystem, the victim of more than a century of deliberate persecution (Robbins, 1986; Reese, 1984). The wolf was once the master predator of Yellowstone's hoofed animals, acting as a natural selective force on the ecosystem's populations of elk, bison, moose, and deer. Wolves culled the ungulate populations (especially elk) by preying upon sick, old, weak, unwary, and occasionally healthy animals. Their kills were a source of carrion for the ecosystem's scavengers. In short, the wolf was once a natural part of the on-going ecological process in the Yellowstone Ecosystem. It is the only living mammal species known to be missing from the region.

Wolves probably will never recolonize the Greater Yellowstone Ecosystem on their own. The remaining populations in North America are quite a distance away, and the intervening lands are too highly developed for natural dispersal to occur. Yet biologists agree that the ecosystem contains sufficient habitat and resources to sustain a viable population of wolves. Cooperative efforts at the federal and state levels are underway to develop a plan for reintroducing wolves to the Greater Yellowstone Ecosystem. We strongly support the prompt reintroduction of the gray wolf to the ecosystem. The species that once exterminated the wolf should now bring it back.

Vegetation Manipulation

Logging

Management prescriptions in both the Bridger-Teton and Gallatin draft plans use wildlife diversity as a justification for logging. However, a careful review of these prescriptions in light of their likely effects on populations of birds and mammals in the ecosystem reveals that these forest practices do not benefit the biological diversity of the ecosystem and, in fact, are more likely to harm it.

Logging increases the proportion of openings and early successional habitats. While these changes are beneficial to widespread early successional species (for example, various vole species, dark-eyed junco, and MacGillivray's warbler), they are detrimental to less common late successional species (for example, the marten, goshawk, and Williamson's sapsucker). Logging is also accompanied by other disturbances, such as roads and human intrusion, that are harmful to species such as the elk and grizzly bear.

Because natural openings and early successional habitats are already abundant throughout the ecosystem, additional management for species that benefit from commercial logging is a low priority (see Samson and Knopf, 1982). Indeed, there are no rare or imperiled species that would benefit appreciably from a commercial timber program, whereas several might actually be harmed. Wildlife diversity, in short, provides no justification for commercial logging in the Greater Yellowstone Ecosystem.

Fire

Fire has long played a crucial role in maintaining the natural diversity of the Greater Yellowstone Ecosystem (Norse et al., 1986). To the maximum extent possible without endangering human life or private property, a natural fire cycle should be maintained on wilderness and roadless lands throughout the ecosystem. If a clearly demonstrated need arises for vegetative changes to benefit wildlife, prescribed burning should generally be used as an alternative to timber harvesting.

Creating Restoration Areas

Due to past episodes of excessive logging and road construction, some areas of the ecosystem are in need of restoration. All exploitative activities within these damaged areas should be halted and existing roads closed. In many cases, natural succession should be sufficient to allow the areas to recover. However, in some instances, a carefully planned program of revegetation will be necessary. Some areas in need of restoration -- called "Phoenix areas" -- are listed below by national forest:

Bridger-Teton: Mt. Leidy Highlands, including the Spread Creek area; portions of Upper Green River and Union Pass; Mosquito Creek; Riley Ridge; and Big Sandy.

Shoshone: Burroughs Creek; Horn Creek; Jewels Bowl; Togwotee; and Sheridan Creek.

Gallatin: Little Bear Canyon and Squaw Creek.

Targhee: Island Park; Badger Creek; Lee Creek; and Bitch Creek.

Measuring Cumulative Effects

Presently, development activities are permitted on the seven national forests with little regard for their cumulative impact on the ecosystem as a whole. Forest plans consider the effects of logging or drilling only as they pertain to an individual forest. Yet in this part of the world where a single grizzly bear may roam over hundreds of miles and where elk herds freely migrate across federal jurisdictions, such planning is provincial and inadequate. The Greater Yellowstone Ecosystem suffers from the "tyranny of small decisions," wherein numerous decisions on related environmental issues are made more or less independently, and their combined consequences are not considered (National Research Council, 1986).

Proposed development on national forest lands in the western portion of the ecosystem is a case in point. The Gallatin and Targhee National Forests both adjoin the western boundary of Yellowstone National Park. The forest plans propose or permit a number of activities near the Park, including timber sales, oil and gas drilling, geothermal exploration, and a major ski development. The potential impact of these activities is to create a "wall" of human disturbance effectively isolating Yellowstone National Park from the west side of the ecosystem. Yet neither of the forest plans for the Gallatin and Targhee National Forests recognizes the cumulative impact of these developments on the Park or the region as a whole.

The recommendations contained throughout this report address the problem of cumulative effects by calling for overall reductions in commodity resource exploitation in the ecosystem. In addition, the Forest Service should institute an ecosystem-wide process of cumulative effects analysis, similar in spirit to the process now being devised for the grizzly bear. Our recommendations are sensitive to the fact that land and resource planning must proceed from the perspective of the entire ecosystem, rather than forest by forest. We urge the Forest Service to do likewise.

ECONOMIC AND SOCIAL VALUES OF THE ECOSYSTEM

The economic base of the Intermountain West and Northern Rockies is changing. Agriculture, mining, energy development, and timber -- the traditional foundations of economic growth -- today face an uncertain future as prices drop and competition from more efficient producers rises. At the same time, the recreation and tourism industry is emerging as a driving and stabilizing force in the regional economy. Yet expenditures on the region's national forests remain heavily weighted towards resource exploitation to the detriment of resources that serve to attract large numbers of visitors to the area each year.

A Changing Economic Base

In the Greater Yellowstone region, economic reality is causing entreprenuers, local government officials, and concerned citizens to revise their plans for the future. As the region's traditional industries decline, many foresee recreation and tourism-related commerce as the most important component of the region's economy. Indeed, in areas immediately adjacent to Grand Teton and Yellowstone National Parks, tourism and recreation are already well established as the basic economic sectors. We believe that similar nonconsumptive development that relies on the region's natural comparative advantages should be encouraged elsewhere in the ecosystem.

As noted in a report prepared for the Wyoming Futures Project by SRI International, much of the area's past development has been unplanned and fortuitous, based largely on the export of raw commodities (SRI, 1985). While this has led to significant economic growth, it has also left the economy vulnerable to rapid changes in resource demand. In the past, falling market demand for one commodity was often offset by growth in the demand for another. Recently, however, the markets for a number of the region's traditional exports have simultaneously declined.

Between 1979 and 1984, most of Montana's basic industries suffered permanent losses of jobs and income as plants and mines closed and an interstate railroad ceased operations. In Idaho, employment in the state's timber industry fell by more than 20 percent over the same period. In Wyoming, agriculture, mining, and energy development have all suffered sharp declines in the face of falling prices and increasing supplies.

Economic health and stability in the future will in large part depend on the region's ability to diversify its economic base. According to the Wyoming Futures Report, a broader range of industries are needed "...so that one 'no' doesn't leave a whole town jobless and dying." The report also notes that one of the region's most enduring and unique resources is the attractiveness of its abundant natural beauty to outside visitors:

> What Wyoming needs is a strategy for action that builds on its comparative advantages of natural resources, natural beauty and wildlife....Such a strategy would focus on the "driving sectors" of the state's economy -- tourism is a good example....Travel, recreation, and tourism constitute a "clean" industry and are therefore much in keeping with Wyoming's values. This industry can generate real net wealth for the state by drawing financial resources from other less scenic and environmentally rich states and do so without consuming natural resources or damaging the environment....Simply stated, this industry can have significant economic and cultural advantages for Wyoming -- it must be further developed. (Original emphasis; SRI, pp. I-7 and III-57)

As the custodian of much of the natural resource base in the region, the Forest Service will of necessity play a major role in the future development of the recreation and tourism industry. If this industry is to attain its full potential and enlarge its contribution to the economy of the region, the Forest Service can not continue in its old ways. In particular, commodity development cannot remain the agency's top priority without jeopardizing the resource base for recreation and tourism. Appropriate commodity development can proceed, but protection of the noncommodity resource base must become the agency's top priority.

Forest Service Budget Priorities

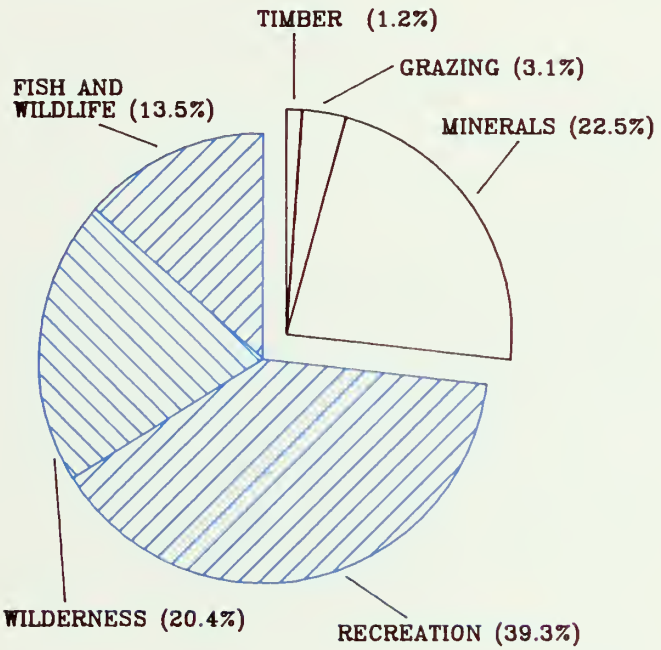
Forest Service priorities have not kept pace with changing economic conditions. This can readily be seen by comparing the projected benefits of forest resource outputs with proposed Forest Service budgets. Recreation, wildlife and related values account for the vast majority of benefits flowing from the national forests in the Greater Yellowstone Ecosystem. At the same time, the proposed budgets for these forests reflect an unswerving commitment to resource development at the expense of more valuable nonmarket commodities.

As shown in Figure 1, page 17, for example, recreation, fish, wildlife, and wilderness are expected to account for nearly 75 percent of the total benefits of resource outputs on the Bridger-Teton National Forest over the next five decades. The balance is composed of benefits from minerals, grazing, and timber.

The allocation of Forest Service expenditures, on the other hand, is nearly reversed. As shown in Figure 1, timber, minerals, and range will account for almost 60 percent of planned expenditures on the forest over the same period. Timber alone,

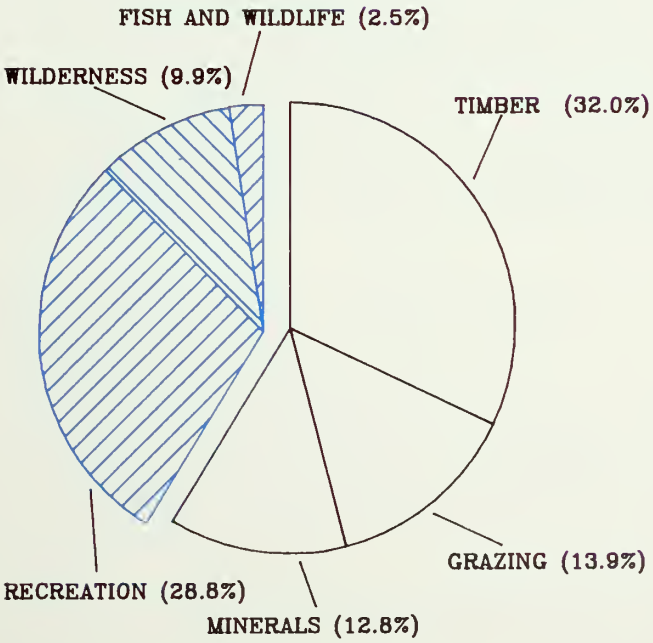
FIGURE 1: COMPARISON OF RESOURCE BENEFITS AND EXPENDITURES
BRIDGER–TETON NATIONAL FOREST, 1986–2035

BENEFITS



Recreation, fish, wildlife, and wilderness will account for nearly 75 percent of the total benefits of resource outputs on the Bridger–Teton National Forest over the next 50 years. Minerals, grazing, and timber will account for the balance. In contrast, spending to support timber, minerals, and grazing programs will account for nearly 60 percent of all planned expenditures over the same period. Timber alone, which makes up only one percent of total benefits, will account for more than 30 percent of future expenditures.

EXPENDITURES



SOURCE: Preferred alternative, Draft Environmental Impact Statement, Bridger–Teton National Forest. Grazing values from Final Grazing Fee Review and Evaluation, USDA–FS/USDOI–BLM, February, 1986.

which makes up only one percent of total benefits -- and makes a negative contribution to net benefits -- accounts for more than 30 percent of planned expenditures. In contrast, recreation, fish, wildlife, and wilderness will together account for less than 42 percent of future expenditures. (1)

The situation on the Gallatin National Forest is even more dramatic. According to the Gallatin DEIS, page II-89, over 80 percent of the forest's total benefits stem from recreation related outputs, while less than 20 percent of planned expenditures are for recreation. Timber and roads, on the other hand, account for 15 percent of total benefits and nearly three-quarters of planned expenditures. (2)

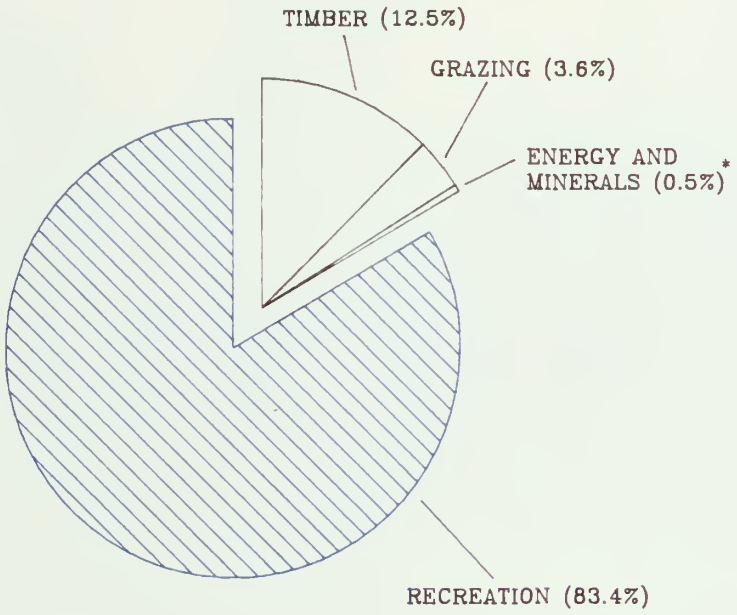
Such budgetary imbalance has led to tangible and deleterious effects on the noncommodity resource base -- and it will continue to do so in the future. On the Bridger-Teton National Forest, for example, the demand for nonroaded dispersed recreation is expected to outstrip the forest's capacity in the near future (Bridger-Teton Plan, p. II-52). And in many areas of the forest, wilderness use has already surpassed capacity or will do so shortly (ibid.). Indeed, because of too little wilderness and inadequate funding, more than 30 percent of wilderness use under the preferred alternative is expected to be "less than standard" (Bridger-Teton DEIS, p. II-123). According to the DEIS, "[c]urrent funding is not adequate to prevent environmental damage in heavy use recreation areas and Forest Service investments in trails are being lost due to inadequate maintenance" (Bridger-Teton Plan, p. II-52).

At the same time, planned expenditures in support of timber production on the Bridger-Teton will fund an additional 450 miles of roads on the forest over the next five decades. Among other things, this will result in a reduction of 28,000 acres now used for primitive recreation and more than 80,000 acres used for semi-primitive nonmotorized recreation (Bridger-Teton Plan, p. IV-2). Lands available for roaded natural recreation, for which there is already a large excess capacity, will increase by more than 140,000 acres over the same period (ibid.).

The imbalance in Forest Service budgets also ignores the current employment benefits derived from the recreation base and will undermine the expansion of those benefits in the future. Currently, employment induced by activities on national forestland in the ecosystem is overwhelmingly related to recreation. As shown in Figure 2, page 19, recreation accounts for more than 80 percent of all direct employment generated by Forest Service activities. Nearly two-thirds of total employment stemming from forest resources, including direct, indirect, and induced employment, is also related to recreation. In contrast, timber, grazing, minerals, and energy development account for only 17 percent of direct employment and 35 percent of total forest-related employment in the ecosystem.

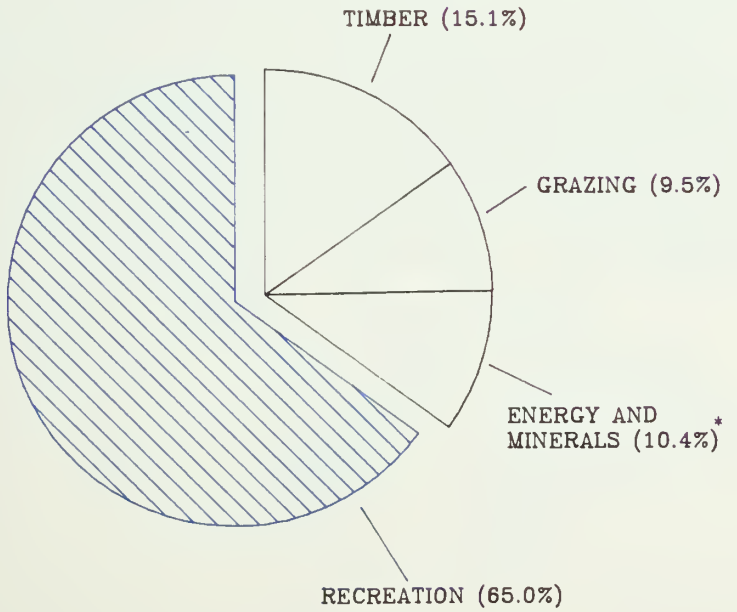
FIGURE 2: EMPLOYMENT STEMMING FROM NATIONAL FOREST ACTIVITIES IN THE GREATER YELLOWSTONE ECOSYSTEM

DIRECT EMPLOYMENT



Recreation accounts for more than 80 percent of all direct employment generated by Forest Service activities in the Greater Yellowstone Ecosystem. Nearly two-thirds of total forest-related employment (direct, indirect, and induced) also stems from recreation. Timber, grazing, energy, and minerals together account for only 17 percent of direct employment and 35 percent of total forest-related employment in the ecosystem.

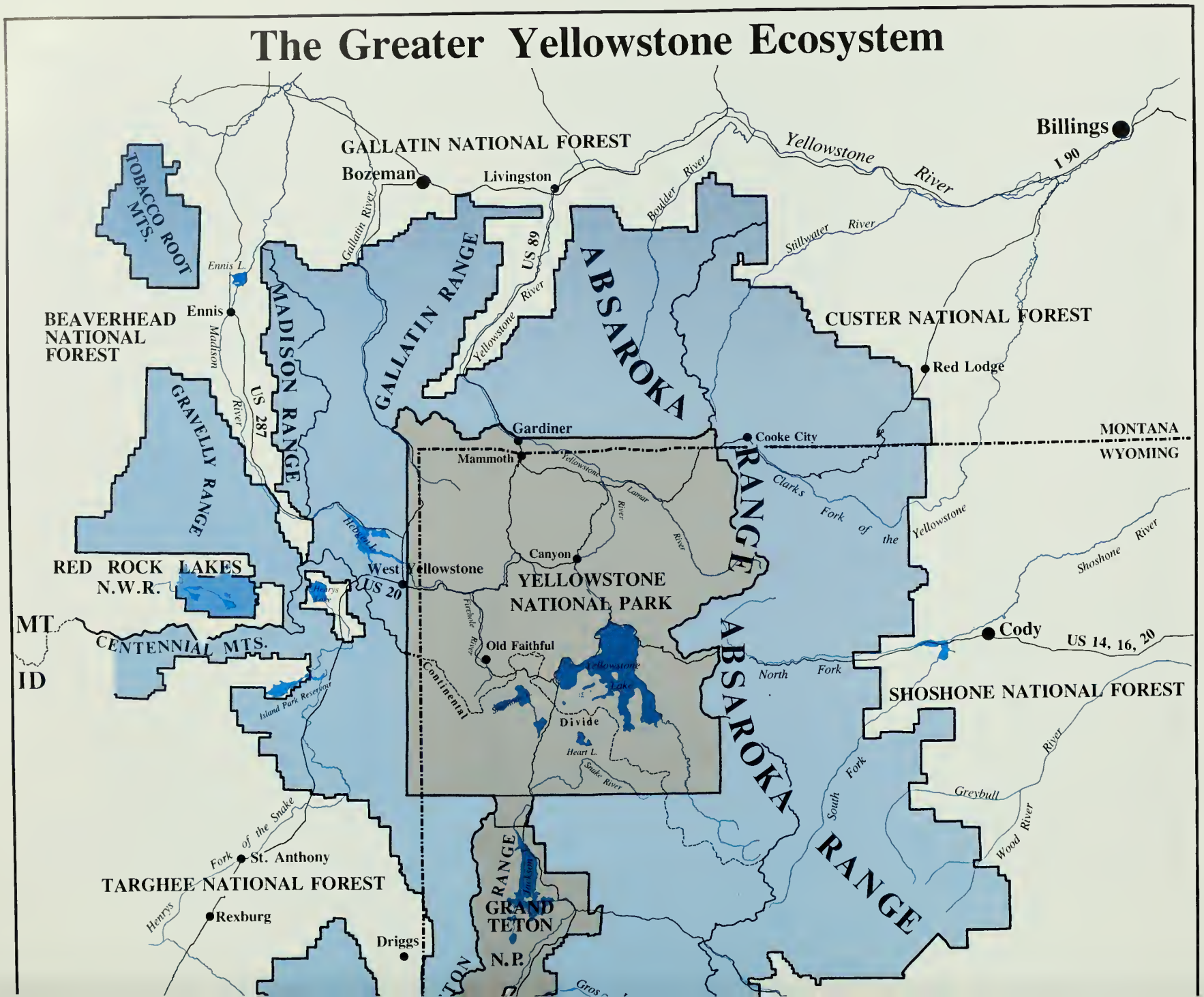
TOTAL EMPLOYMENT

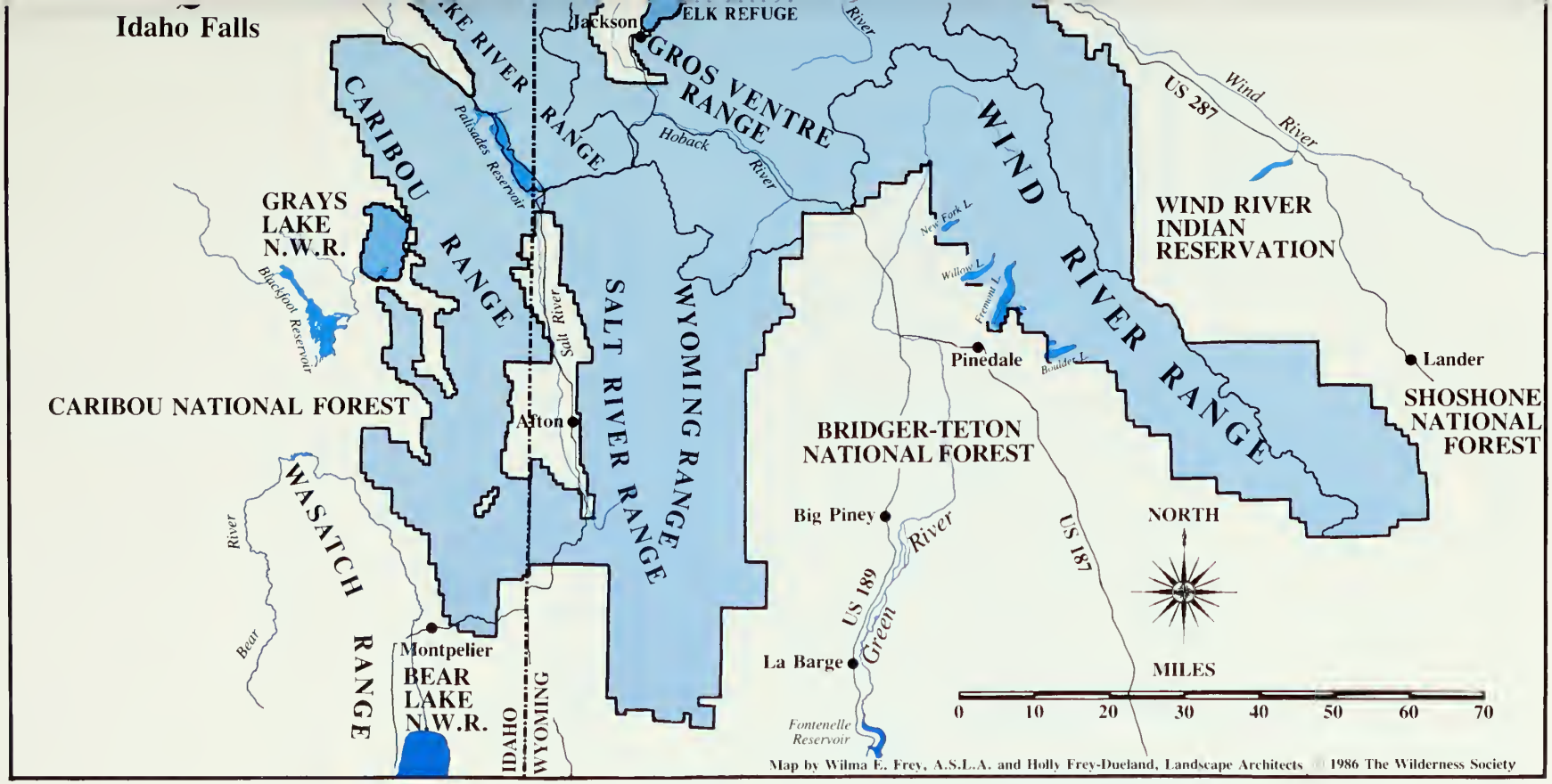


*Energy and minerals employment excludes jobs from phosphate mining. Though a significant source of employment, phosphate mining is confined entirely to portions of the Caribou National Forest on the periphery of the ecosystem.

SOURCE: *U.S. Forest Service, for the U.S. House of Representatives, Washington, D.C., December*, 1986.

The Greater Yellowstone Ecosystem





Map 1. Federal Lands of the Greater Yellowstone Ecosystem

National Forest System

National Park System

National Wildlife Refuge System

Private, state, or Bureau of Land Management (BLM) land, or Indian Reservation

Expenditures by the Forest Service in the Greater Yellowstone Ecosystem should be reallocated to more closely reflect the relative values of the resource outputs provided by the seven forests. In particular, expenditures for noncommodity resources such as wildlife, recreation, and wilderness should be significantly increased. Budgets for commodities with a declining comparative advantage, such as timber, should be reduced.

NOTES

(1) Percentages given for resource benefits and costs are for the preferred alternative in the Bridger-Teton National Forest draft plan. Fixed costs and water and soil benefits and costs were not included in totals. Present values for resource totals were calculated at the midpoint of each decade using a four percent discount rate. Discounted resource benefits are from Tables II-9 and II-10 (DEIS, pages II-62 through II-73) except as noted below for timber and grazing. Discounted resource costs are from Table II-5 (DEIS, page II-54), Table II-10 (DEIS, pages II-69 through II-73), and Table C-2 (DEIS, pages C-2 through C-7). Discounted timber receipts are based on prices received on the Bridger-Teton over the period 1980 to 1985. They are based on net timber receipts given on page B-VI-1 of the DEIS and timber costs from Table II-10 (DEIS, page II-69). Discounted range benefits are based on a fair market value of $6.84 per animal unit month (AUM). This is the fair market value of federal rangelands as established by the USDA-FS/USDOI-BLM Final Grazing Fee Review and Evaluation, 1986.

(2) Percentages given are for the preferred alternative in the Gallatin National Forest draft plan. Fixed costs were not included in total for discounted costs. Percentages are based on Table II-19 (Gallatin DEIS, page II-89).

EXTRACTIVE INDUSTRIES IN THE ECOSYSTEM

In order to protect the irreplaceable natural resources in the Greater Yellowstone Ecosystem, the extractive industries -- timbering, grazing, and mineral development -- must play a secondary role in national forest management. Highest priority must be given to resource stewardship objectives that enhance soil, watershed, plant, and wildlife productivity and protect scenic beauty.

Despite clear evidence of resource degradation resulting from past commodity exploitation, including subsidized logging and grazing, the Forest Service proposes to continue and even increase such activities in the ecosystem. For example, the Forest Service proposes to increase timber harvesting on ecosystem forests by 20 percent during the next decade. Harvests would increase from the 1979-1984 average of approximately 129 million board feet to 155 million board feet per year. (See Map 4, Appendix C, for location of Forest Service proposed suitable timberlands over the next 50 years.) As a consequence of the proposed timber program, the national forest road system will increase 14 percent in the next decade from the current 6,600 miles to 7,500 miles. In addition, most land in the national forests will remain open for oil and gas exploration and development. Such activities will year by year erode the ecosystem's wildland resource base.

Resource development should not be allowed to further degrade biological diversity, water quality, geologic and scenic resources, and the overall integrity of the ecosystem. Rather, the resources in the area should be developed only on an environmentally sound basis. Where degradation has already occurred, further resource exploitation should be excluded and restoration efforts, such as road obliteration, should be implemented.

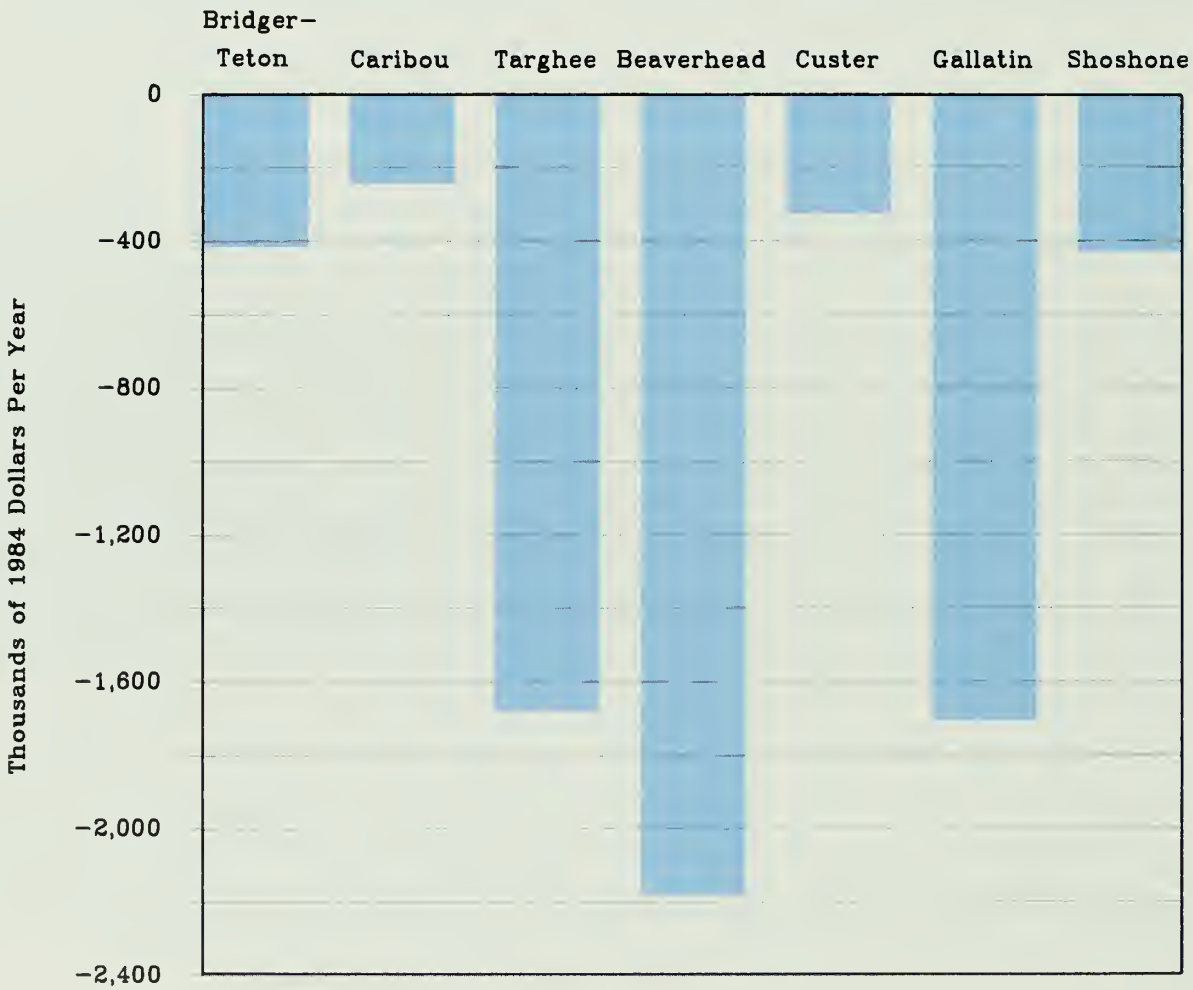
Timber Production

Timber Sale Economics

Large-scale timber production is the least defensible resource activity in the Greater Yellowstone Ecosystem. It results in federal taxpayer losses on every national forest in the region.

As shown in Figure 3, page 22, over the period 1979-1984, annual timber program costs exceeded timber receipts on all seven of the region's national forests. Regionwide losses over the six-year period averaged nearly $7 million per year, or 55 cents for every dollar invested in timber production (unless otherwise noted, all dollar values are expressed in terms of 1984 dollars). Six-year average losses for individual national forests ranged from $241,000 per year on the Caribou National Forest to $2.2 million dollars per year on the Beaverhead National Forest.

FIGURE 3: TIMBER PROGRAM LOSSES ON NATIONAL FORESTS IN THE GREATER YELLOWSTONE ECOSYSTEM, ANNUAL AVERAGE, 1979–1984



In most years, timber program costs exceed timber receipts on all national forests in the Greater Yellowstone region. Over the period 1979–1984, region wide losses averaged nearly $7 million per year. Six–year average losses on individual national forests ranged from $241,000 per year on the Caribou National Forest to $2.2 million per year on the Beaverhead National Forest.

SOURCE: U.S. Forest Service, Office of Timber Management, Washington, D.C., March, 1985.

The logging program on the Bridger-Teton National Forest, which lost an average of $418,000 per year, generally typifies the region's timber production problems. As shown in Table 2, page 24, during the period 1979 to 1984, net timber receipts on the Bridger-Teton were positive only in 1980. Since then, net receipts have fallen dramatically. In 1983, the forest recovered only 16 cents for each dollar invested in timber production.

The decline in net timber receipts on the Bridger-Teton is part of a regionwide decline in timber markets that began in 1980. Market demand for timber in the Rocky Mountains peaked during the late 1970s. After 1980, the demand for timber plummeted, and in some areas prices dropped to less than one-third their pre-1980 level. Although demand has rebounded somewhat since 1983, timber prices have generally remained far below the level of the late 1970s. Current expectations, moreover, are that prices will remain low for the foreseeable future.

Nevertheless, in developing plans for future timber production, virtually every national forest in the region assumed that pre-1980 timber prices would prevail in the future. In addition, many forests, such as the Gallatin, Beaverhead, and Custer, also assumed that timber prices would rise dramatically over time. These assumptions led forest planners throughout the Greater Yellowstone Ecosystem to propose far more logging than can be justified economically.

The level of harvests proposed in the region were also affected by various constraints placed on the forests' planning models. The level and timing of timber harvests on all national forests are determined with the aid of a computer model called FORPLAN. This model selects the most "cost-effective" schedule of future timber harvests based on estimated timber growth rates, projected future prices, costs, and other values. Invariably, however, the "optimum" level of harvest is determined by various constraints placed on the model.

The effect of these constraints on harvest levels proposed for the Bridger-Teton is detailed in an unusually revealing section of the Bridger-Teton DEIS. One constraint examined in the DEIS is the harvest floor placed on the model for the preferred alternative. On forests such as the Bridger-Teton, where timber values are low relative to costs, it is often necessary to place a floor on timber harvests to force the model to "harvest" more than it otherwise would. For the preferred alternative, a floor of 15.9 million board feet per year was used for the first decade.

According to the DEIS, the effect of removing this constraint was to lower the first decade harvest level to 2.2 million board feet per year (Bridger-Teton DEIS, p. B-VI-61). In other words, 13.7 million board feet per year of the annual harvest proposed for the forest cannot be justified economically and was therefore not selected for harvest by the model. This is

TABLE 2: TIMBER RECEIPTS AND EXPENDITURES ON THE BRIDGER-TETON NATIONAL FOREST, 1979-1984

	Fiscal Year						Six Year Average
	1979	1980	1981	1982	1983	1984	
	(Thousands of 1984 Dollars)						
Timber Receipts: (1)							
Cash	1393	1863	522	311	101	807	833
Non-cash	428	720	629	282	79	7	358
Total	1821	2583	1151	594	179	814	1190
Timber Expenditures: (2)							
Sale Preparation and Administration	712	556	466	519	611	1054	653
Reforestation and Stand Improvement	276	153	249	142	118	70	168
Timber Road Construction	999	1277	1183	558	411	298	788
Total	1987	1986	1898	1219	1140	1422	1609
Net Timber Receipts:	-167	597	-747	-626	-961	-608	-418
Ratio of Timber Receipts to Expenditures:	0.92	1.30	0.61	0.49	0.16	0.57	0.74
	(Millions of Board Feet)						
Volume of Timber:							
Offered	24.0	28.0	25.0	30.0	39.0	22.0	28.0
Sold	23.7	20.2	18.4	9.2	35.2	17.2	20.7
Harvested	22.0	21.0	17.0	9.0	11.0	33.0	18.8

(1) Timber receipts are the sum of cash and non-cash receipts for timber harvested on the national forests. Cash receipts include payments for timber and funds collected under the Knutson-Vanderberg Act for reforestation and timber stand improvement. Non-cash receipts equal the value of timber given to purchasers in exchange for the construction of timber access roads. Such non-cash payments are known as "purchaser road credits".

(2) Timber expenditures are defined as: a) Sale Preparation and Administration - includes expenditures for sale preparation and administration, stand examination, timber salvage operations, and timber sale support; b) Reforestation and Stand Improvement - includes funds collected under the Knutson-Vanderberg Act for reforestation and timber stand improvement (data on appropriated funds used for this purpose are not available); c) Timber Road Construction - includes "purchaser road credits," road contribution, engineering support expenses and appropriated funds used for timber road construction.

SOURCE: U.S. Forest Service, Office of Timber Management, Washington, D.C., March 1985.

true even though timber prices assumed in the model are nearly three times higher than prices received on the forest since 1980.

The effects of price assumptions made by forest planners were also examined in the Bridger-Teton DEIS. Timber prices assumed in FORPLAN were based on timber sales made during the period 1970 to 1979. As noted, since that time timber values have fallen considerably. To determine the effect that lower timber prices would have on net timber receipts in the preferred alternative, planners reran the preferred alternative FORPLAN model using an average of prices received on the forest during the period 1980 to 1985.

The results of this analysis indicate that instead of losing $25,000 per year (expressed in 1982 dollars) during the first decade with large positive net receipts in later decades, losses would increase to more than $900,000 per year during the first decade and to well over $1 million per year for the next five decades (Bridger-Teton DEIS, p. B-VI-1). Although planners did not test to see how harvest levels would be affected by lower prices, it is almost certain that virtually no timber could be economically harvested at current or likely future prices.

Also of interest is the effect of the harvest constraint used in the "current direction" alternative in the Bridger-Teton plan. The timber base for this alternative includes a number of undeveloped areas, such as Mount Leidy Highlands. To access these areas would require a large amount of road construction. These areas are not included in the timber base for the preferred alternative.

The harvest constraint used in the current direction alternative is 25 million board feet per year during the first decade. Because this constraint forces the model to harvest highly uneconomic areas, removing it caused the harvest level in the first decade to fall to zero. According to the DEIS, removing the harvest constraint also caused "a significant increase in recreation benefits and quality, and visuals...[as well as] an upward trend in wildlife populations" (Bridger-Teton DEIS, p. B-VI-37).

Unfortunately, the Forest Service timber program for the Bridger-Teton is representative of other national forests in the region. Current proposals for the Greater Yellowstone region will require millions of dollars annually in taxpayer subsidies, while threatening critical wildlife habitat and further degrading the much more valuable resource base for recreation and tourism.

The Forest Service should acknowledge that timber production is no longer an appropriate priority in the ecosystem and take the initiative to phase out below-cost timber sales over the next ten years. Timber production in the region should be directed principally toward meeting local needs for poles, posts, building materials, and firewood.

Environmental Impacts

Reforestation and Silvicultural Practices. Prompt reforestation following timber harvest is an integral part of sound silviculture. The Forest Service, according to law, must manage its lands on a sustained yield basis by not harvesting trees faster than they can be grown. The National Forest Management Act directs the Forest Service to cut timber only on lands that can be restocked within five years and to use clearcutting only where it is consistent with forest regeneration.

Each of the long-term management plans issued by the Forest Service in the ecosystem calls for a continuation of timber harvesting in areas that are unsuitable for timber production. These sites are often characterized by steep slopes, less stable landtypes, and harsh climatic factors that can prevent successful reforestation within the five-year requirement of the NFMA.

Nevertheless, the Forest Service maintains that such conditions do not limit the suitability of lands for timber production. Management plans for the Gallatin, Shoshone, and Bridger-Teton National Forests do not remove any land from their suitable timber bases because of possible reforestation difficulties. This decision ignores the fact that each of these forests contains landtypes of shallow and rocky soils, steep slopes, and high elevations. Moreover, the plans rely primarily on clearcutting and planting rather than partial cutting and natural reforestation.

At the national and regional level, Forest Service officials have instructed planners not to consider economics in assessing the reforestation potential of proposed timberlands and to assume that "all problems are solvable." This management direction is difficult to justify in the Yellowstone Ecosystem national forests. As the Forest Service shifts more of its timber harvesting activities to steeper terrain, reforestation difficulties and planting costs will rise. For example, the Gallatin DEIS states that "[p]lanting is labor intensive and costs are high. It is more expensive to plant on slopes over 40 percent; on thin, rocky soil; and on clearcuts" (Gallatin DEIS, p. IV-53).

Reliance on expensive artificial regeneration exacerbates the below-cost timber sales problem in the ecosystem. It also will tend to divert additional funding away from the already underfunded programs for recreation and other noncommodity resources. Rather than expanding its attempts at costly artificial regeneration, the Forest Service should confine its timber harvesting activities to sites and silvicultural techniques that assure natural reforestation within five years. This management direction requires a careful review of the role of clearcutting throughout the ecosystem. The Shoshone forest, for example, has achieved better regeneration and less site damage by shifting from clearcutting to shelterwood cuts.

A policy emphasizing natural reforestation would protect fragile watersheds and high quality waters, as well as enhance species and genetic diversity in the ecosystem. Such a policy encourages timber management on more favorable sites and would result in management of the ecosystem in an environmentally and economically sensitive manner.

Water Quality and Fish Habitat. The headwaters of three major river systems of the West -- the Snake, Missouri, and Green -- rise in the Greater Yellowstone Ecosystem. Many of these waters have achieved national fame for their fishery resources. The Madison River fishery alone generates in excess of $10 million annually for the region's economy (State of Montana, 1986).

Sediment generated by land-disturbing activities poses one of the greatest threats to water quality and fisheries within the ecosystem. Many of the ecosystem's watersheds are steep and consist of unstable soils ill-suited for roadbuilding and other land-disturbing activities. When disturbed, these lands can dump tons of sediment into streams, smothering important fish habitat.

Highly unstable soils, subject to massive erosion and landslides if disturbed, occupy 151,200 acres of the Gallatin Forest (Gallatin DEIS, p. III-3). Many landtypes on the Wind River District of the Shoshone Forest are documented as unstable (Greater Yellowstone Coalition, 1986). A 1971 survey of the Teton National Forest indicated 57 percent of the forest to be of unstable landtypes (Bailey, 1971). Roadbuilding, timber harvesting, and petroleum exploration and development only aggravate the inherent instability of much of the ecosystem's wildlands.

Each national forest proposes to expand timber harvesting and other commercial activities into these steep, unstable areas, thus greatly increasing the risk of water quality and fishery degradation. The Gallatin draft plan, for example, acknowledges that increased road construction associated with timber harvesting will have a negative effect on the availability of catchable trout (Gallatin DEIS, p. II-14).

The Forest Service has consistently failed to assure that water quality will be protected against degradation. According to the State of Montana, "[A]ccelerated road building and timber harvesting on U.S. Forest Service lands now pose the greatest single threat to aquatic life" (State of Montana, 1986). Similarly, the U.S. Environmental Protection Agency commented that the Gallatin draft plan "poses a significant threat to water quality and soil stability" (U.S. Environmental Protection Agency, 1985). While the Bridger-Teton draft plan promises that sedimentation will be held to "acceptable limits," it does not use in-stream measurements to monitor water quality. Instead, a "soil loss tolerance" evaluation is applied which only measures soil erosion and its impacts on the productivity of the land. Sediment impacts to fisheries will not be determined.

Roadbuilding, timber harvesting, and oil and gas activities threaten water quality and fishery resources of the Greater Yellowstone Ecosystem. Land should be designated as suitable for these activities only if water quality and fishery resources can be fully maintained and protected.

Timber Cutting and Wildlife. Throughout the Greater Yellowstone Ecosystem the Forest Service justifies much of its timber harvesting by citing big game wildlife benefits. However, these alleged benefits are contradicted by state wildlife managers. For example, in commenting on the Gallatin plan the State of Montana wrote, "The Plan does not substantiate the need to improve the forage/cover ratio for wildlife on the forest. We are not convinced that such a need exists on the Gallatin National Forest" (State of Montana, 1986).

The Bridger-Teton's elk herds exemplify the limited opportunities that exist to improve big game wildlife habitat in the ecosystem through timber harvesting. Estimated to number about 30,000 animals, the forest's elk population -- both through hunting on the forest and wildlife viewing on the adjacent National Elk Refuge -- contributes millions of dollars annually to the region's economy.

Timber harvesting on the Bridger-Teton, if beneficial to elk at all, serves only to open up dense stands of timber for forage production. However, abundant natural openings distributed throughout the forest already provide ample forage for elk. While forage itself is not a constraining factor on the Bridger-Teton's elk, its availability is often limited by the lack of adjacent security cover.

Elk need undeveloped areas of forestland for security and escape cover during calving and rearing periods, during hunting seasons, and for thermal cover during summer and winter months. Logging, together with roadbuilding, eliminates elk sanctuaries and hampers seasonal migrations. Elk studies throughout the Northern Rockies demonstrate that virtually every road built into elk habitat is a detriment to the resident population. Even if later closed to traffic, roads still allow more human access, thus increasing harassment and subsequent displacement of the animals. State wildlife managers worry that ease of access will increase hunter success early in the hunting season, thereby forcing shorter seasons in order to maintain populations. Shorter hunting seasons will clearly have an adverse effect on the region's economy.

In sum, little opportunity exists in the ecosystem to improve existing big game wildlife habitat through timber harvesting, particularly for elk. Any logging justified by big game wildlife benefits must be examined on a case-by-case basis and must consider the cumulative effects of past, future, and adjacent operations.

Mineral Development

Oil, gas, and geothermal exploration and development activities in the Greater Yellowstone Ecosystem are among the most serious threats to the ecological integrity of the area. The southwest portion of the ecosystem lies atop the Western Overthrust Belt, a geologic formation thought to hold significant reserves of oil and natural gas. Exploration and development of these reserves would bring miles of roads and increased human disturbances into the ecosystem. Additionally, the geothermal resources of Yellowstone National Park extend to the adjacent national forests, where they are available for exploitation that could prove detrimental to the geysers and hot springs within the Park.

Of the national forest land in the ecosystem, 60 percent -- 5.9 million acres -- is presently open for oil and gas leasing. A total of 4.7 million acres -- 85 percent of the area available for leasing -- is already under lease or lease application. It is projected that more than one million acres of additional lease applications will be processed upon the completion on the forest plans (Sierra Club, 1986). The Forest Service proposes to make about two million acres on the Bridger-Teton forest available for oil and gas leasing. Several areas on the Bridger-Teton that are important to the ecosystem's integrity, such as Mosquito Creek, Sohare/Upper Gros Ventre Valley, and Spread Creek/Buffalo Valley, are available for oil and gas leasing.

Oil, gas, and geothermal exploration and development displace wildlife populations, degrade water quality, threaten unique features within Yellowstone National Park, and could result in potentially catastrophic impacts. As the Forest Service acknowledges, "[t]he possible establishment of oil and gas fields...represents the greatest potential impact upon water quality of any other foreseeable development....Such a field development would reduce the water quality of the streams in the affected area significantly for the life of the field even with the best environmental planning and safeguards" (Bridger-Teton Draft Plan, p. II-27).

In order to prevent further deterioration of the ecosystem, the Forest Service should terminate all geothermal exploration and development on national forests within the ecosystem and issue no new oil and gas leases pending a site-specific evaluation of impacts. In general, mineral development on the national forests of the ecosystem should be deferred, excepting an overriding national need that clearly outweighs the irreversible damage that would be caused by development.

RECOMMENDATIONS FOR FUTURE MANAGEMENT

The national forests of the Greater Yellowstone Ecosystem are a major component of a unique natural ecological community. Although subject to past disturbances, that natural community and its ecological processes are still largely intact. The challenge facing the managers of national forest lands is to fully realize the comparative advantage of the ecosystem's resources -- its rich assortment of plants and animals and its scenic beauty and grandeur.

Unfortunately, Forest Service management plans for the ecosystem do not respond to this challenge. Instead they will continue to degrade -- and even accelerate degradation of -- the natural values in the ecosystem. During the next decade, timber harvesting would increase 20 percent, road mileage would increase by 14 percent, and 85 percent of available lands would be covered by oil and gas leases.

The Wilderness Society's vision for the future of the ecosystem is quite different. Management of the national forests in the region should focus on the conservation of biological diversity and on preservation of the region as an intact ecological whole. Specifically, priority must be given to the prevention of habitat destruction and fragmentation; to the protection of scenic and geologic values, threatened species, natural communities, and wild areas; and to the restoration of degraded lands. These goals are also an essential part of maintaining a healthy base for the area's recreation and tourism industries.

We therefore urge the adoption of the following recommendations for the national forests of the Greater Yellowstone Ecosystem:

1. Create a macroreserve by preserving and restoring key linkages between wildlands (pp. 6-7)

2. Adopt conservationists' wilderness recommendations for Idaho and Montana (p. 8).

3. Protect imperiled species (pp. 10-12).

    - Allow no commercial timber harvesting, sheep grazing, energy development, or large-scale recreation development in occupied grizzly bear habitat.

    - Reintroduce the wolf into the Yellowstone ecosystem.

    - Acquire critical private inholdings.

4. Rely on natural ecological processes rather than logging for vegetation manipulation and allow natural fires to burn in roadless areas unless they threaten human lives or adjacent lands (p. 13).

5. Restore key areas such as Mount Leidy Highlands and Upper Green River to a natural or near-natural condition (pp. 13-14).

6. Analyze cumulative effects of national forest activities on the ecosystem as a whole (p. 14).

7. Change Forest Service budget priorities to favor noncommodity resources and reduce commodity extraction (pp. 15-20).

8. Phase out below-cost timber sales in the ecosystem within ten years (p. 25).

9. Restrict timber harvesting to suitable lands where natural reforestation within five years is assured and where existing water quality and fishing habitat are maintained and protected (pp. 26-27).

10. Allow petroleum exploration and development only after site-specific environmental analysis and only if there is a demonstrated national need (p. 29).

11. Prohibit geothermal energy exploration or development within the ecosystem (p. 29).

In addition, a mechanism must be developed to insure coordinated management for all lands within the ecosystem. We recommend that the Forest Service join with other federal land management agencies, state and local government entities, and private interests to study and adopt methods to improve management.

These recommended management directions would provide needed protection for the unique ecological resources of the Greater Yellowstone area and enhance the economic future of the region. Together, they constitute an environmentally and economically sound basis for national forest management in the ecosystem. We urge the Forest Service and other concerned parties to support these recommendations and help chart a new course for the future of the Greater Yellowstone Ecosystem.

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APPENDICES

APPENDIX A

THE WILDERNESS SOCIETY

The Wilderness Society is a national conservation organization devoted to the preservation and proper management of the United States' public lands. Founded in 1935, The Society has been in the forefront of major conservation battles for more than half a century. Among The Society's primary achievements has been the fostering of a land ethic, the belief that the land is a resource to be cherished and used wisely. One outcome of this activity was the establishment of the National Wilderness Preservation System.

The Wilderness Society is a nonprofit organization with 160,000 members. Headquartered in Washington, D.C., The Society maintains nine regional offices in Boston, Atlanta, Denver, Bozeman, Phoenix, Boise, San Francisco, Seattle, and Anchorage. In each region, staff members organize local citizens and conservation groups to assist government officials in making land use policy decisions. The Society also monitors federal actions affecting wilderness and public land management, and staff members present information to federal agencies and Congress on a wide range of land preservation issues. The Bozeman office, which opened in November 1986, will help The Society to monitor and influence federal activities in the Greater Yellowstone Ecosystem.

In 1981, The Society became the first membership conservation organization to establish an economic policy department, staffed by resource economists, to provide economic analyses of public land issues. Now called the Resource Planning and Economics Department (see Appendix B), professional foresters, attorneys, ecologists and forest planning specialists have joined the economists to mount a concerted effort to influence policy and management for the national forests.

The Society's Conservation Department maintains five programs -- national parks, Alaska lands, national forests, national wildlife refuges, and lands administered by the Bureau of Land Management. Issue specialists assigned to each program monitor all congressional and federal agency actions relating to their area of expertise.

Staff members in The Society's Public Affairs Department work with both national and regional media to inform the public on public land issues. The Wilderness Society's quarterly magazine, Wilderness, is received by all Society members, congressional offices, and more than 5,000 public libraries.

APPENDIX B

THE WILDERNESS SOCIETY
RESOURCE PLANNING AND ECONOMICS DEPARTMENT

The Wilderness Society Resource Planning and Economics Department (RP&E) is a merger of the organization's Economic Policy Department and Forest Management Program. Over the next several years, RP&E's primary charge is to analyze the economic and ecological consequences of the Forest Service's long range management plans in order to influence future land use and management decisions on the national forests -- 191 million acres of public land.

Formation of the department follows in The Society's tradition of breaking new ground in the national conservation movement. With the establishment of its Economic Policy Department in 1981, The Wilderness Society led the way in providing critical analysis in the debate over natural resource policies on the nation's public lands. RP&E's professional economists, foresters, natural resource planners, and lawyers now markedly enhance The Society's capacity to improve management of the national forests.

Department staff members include:

*Dr. Peter M. Emerson, Vice President, Resource Planning and Economics. Consultant to various organizations in commercial agriculture, rural development, and natural resources. Former senior economist, The Wilderness Society; principal analyst, Congressional Budget Office; program leader and deputy director, Economic Research Service, U.S. Department of Agriculture. B.S. Cornell University; M.S. Cornell University; Ph.D. Purdue University.

*Barry R. Flamm, Chief Forester. Former founding director, Office of Environmental Quality, U.S. Department of Agriculture (USDA); environmental coordinator, USDA; public land specialist, President's Council on Environmental Quality; assistant to Deputy Chief, Programs and Legislation, U.S. Forest Service; supervisor, Shoshone National Forest. B.S. Colorado State University; M.P.A. American University; Ph.D. candidate, University of Maryland.

Peter D. Coppelman, Esq., Senior Counsel. Former chief trial attorney for public land litigation, Land and Natural Resources Division, U.S. Department of Justice; managing partner for private law and consulting firm; directing attorney for the Califonia Rural Legal Assistance Office of the National Senior Citizens Law Center. A.B. Harvard University; Fullbright Scholarship (India); J.D. Cornell Law School; Reginald Heber Smith Community Law Fellow.

R. Steven Richardson, Esq., Senior Counsel Southeast Alaska Project. Former staff director and counsel, Committee on Interior and Insular Affairs, Subcommittee on Oversight and Investigations, U.S. House of Representatives; legislative counsel, Congressman Edward Markey. A.B. Indiana University; J.D. Indiana University School of Law.

Peter C. Kirby, Esq., Senior Counsel. Instructor in Natural Resources Law, George Washington University. Former counsel to the National Wildlife Federation; law clerk, U.S. Court of Appeals for Washington, D.C. Circuit; instructor, Wildlife, Forestry and Public Land Law, Vermont Law School. B.A. Yale College; J.D. Harvard Law School.

*Dr. Richard E. Rice, Resource Economist. Former teaching fellow in natural resource economics, University of Michigan; researcher with the Center for Research on Economic Development in Cameroon, West Africa; staff economist, Office of Policy Analysis, U.S. Department of the Interior. A.B. Grinnell College; M.S. University of Michigan; Ph.D. University of Michigan.

*H. Michael Anderson, Esq., Forest Planning Specialist. Co-author of "Land and Resource Planning in the National Forests" and author of "Umpqua Wilderness Trails: A Hiker's Guide." Former organizer for wilderness proposals on the Umpqua National Forest; legal researcher on national forest litigation. B.A. Yale University; J.D. University of Oregon School of Law.

*Craig Gehrke, Forest Planning Specialist. Former forest management program director, the Idaho Conservation League; range conservationist, U.S. Forest Service (Nezperce and Deerlodge National Forests). B.S. University of Idaho.

Robert W. Turnage, Resource Economist. Former program analyst, Legislative Analyst Office of the California Legislature. B.A. University of California at Santa Cruz; Master of Forest Science, Yale University; Master of Public and Private Management, Yale University.

*Dr. David S. Wilcove, Ecologist. Former research scientist in zoology, The Nature Conservancy; author of numerous scientific publications and popular articles on the conservation of biological diversity. B.S. Yale University; M.A., Ph.D Princeton University.

*Patricia O. Attkisson, Administrative Assistant. Former staff assistant to Congressman Joseph L. Fisher; associate editor, LaMotte News Bureau; communications director, Institute of Certified Travel Agents; editorial assistant, McLean Journal. B.A. Trinity College.

Patricia Harris, Secretary. Former Conservation Department secretary, The Wilderness Society; data processor, Potomac Electric Power Company.

John Reed, Secretary. Former staff assistant, Music Educators National Conference.

Other Society staff members who participated in preparing this report:

*Michael Scott, Northern Rockies Regional Director; former Conservation Department Deputy Director; former Central Rockies Regional Director; M.A. Claremont College; B.A. University of California at Santa Barbara.

*Lynelle Jolley, Public Affairs Specialist. Former legislative assistant to Congressman Howard L. Berman; writer, Berman & D'Agostino Campaigns, Inc.; policy analyst/writer, National Health Policy Forum. B.A. University of California, Los Angeles.

Consultants

*Wilma Frey, Land and Resource Planning/Policy Analyst, Master of Landscape Architecture and Master of Public Administration, Harvard University.

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* The Wilderness Society Staff members and others who prepared this report on the national forests of the Greater Yellowstone Ecosystem.

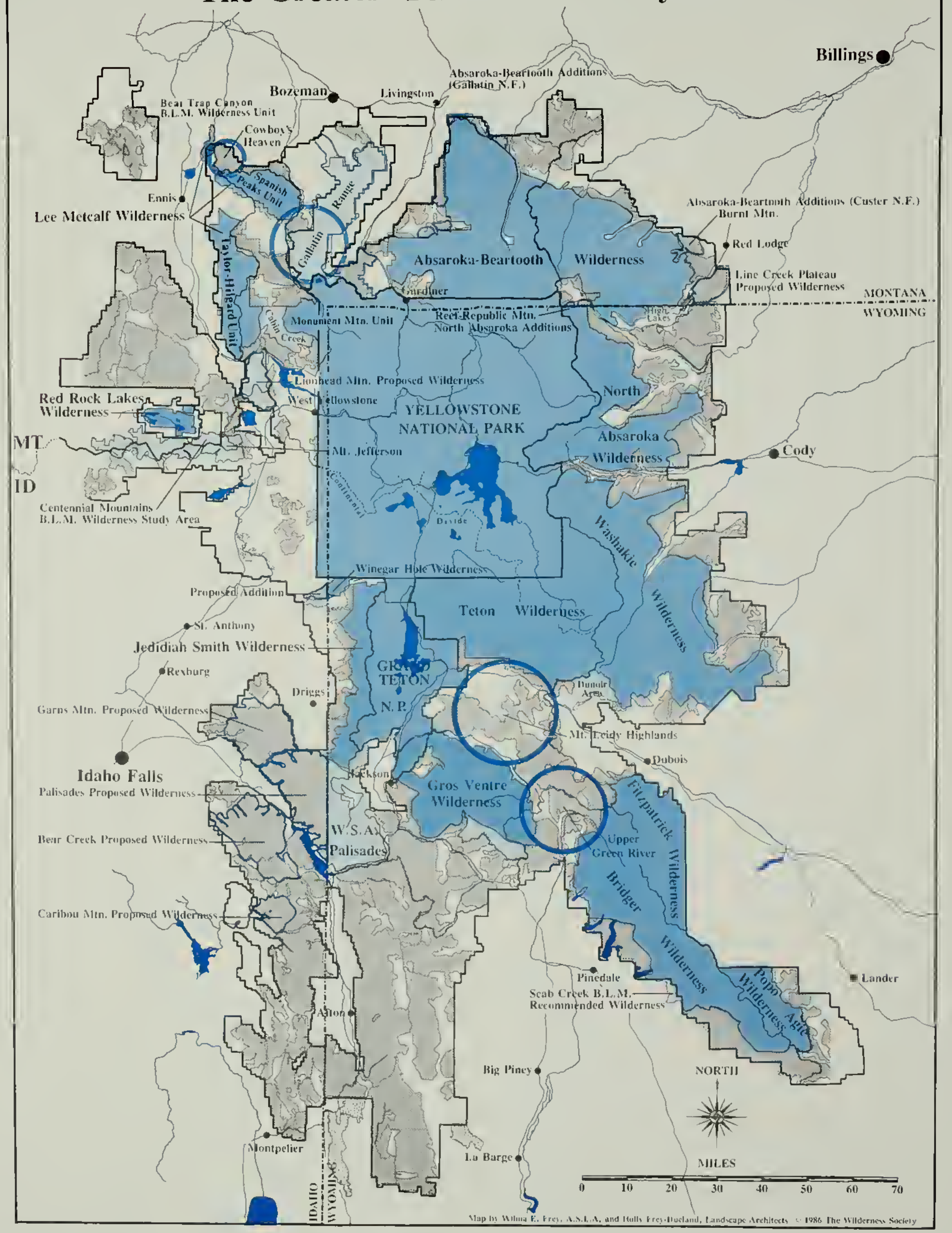
APPENDIX C

MAPS

The following three maps are enclosed in the inside back cover.

- The Wild Lands of the Greater Yellowstone Ecosystem
- Occupied Grizzly Bear Habitat in the Greater Yellowstone Ecosystem
- Planned Logging on National Forests in the Greater Yellowstone Ecosystem

The Greater Yellowstone Ecosystem



Map 2. Wild Lands of the Greater Yellowstone Ecosystem

Protected Wild Lands:

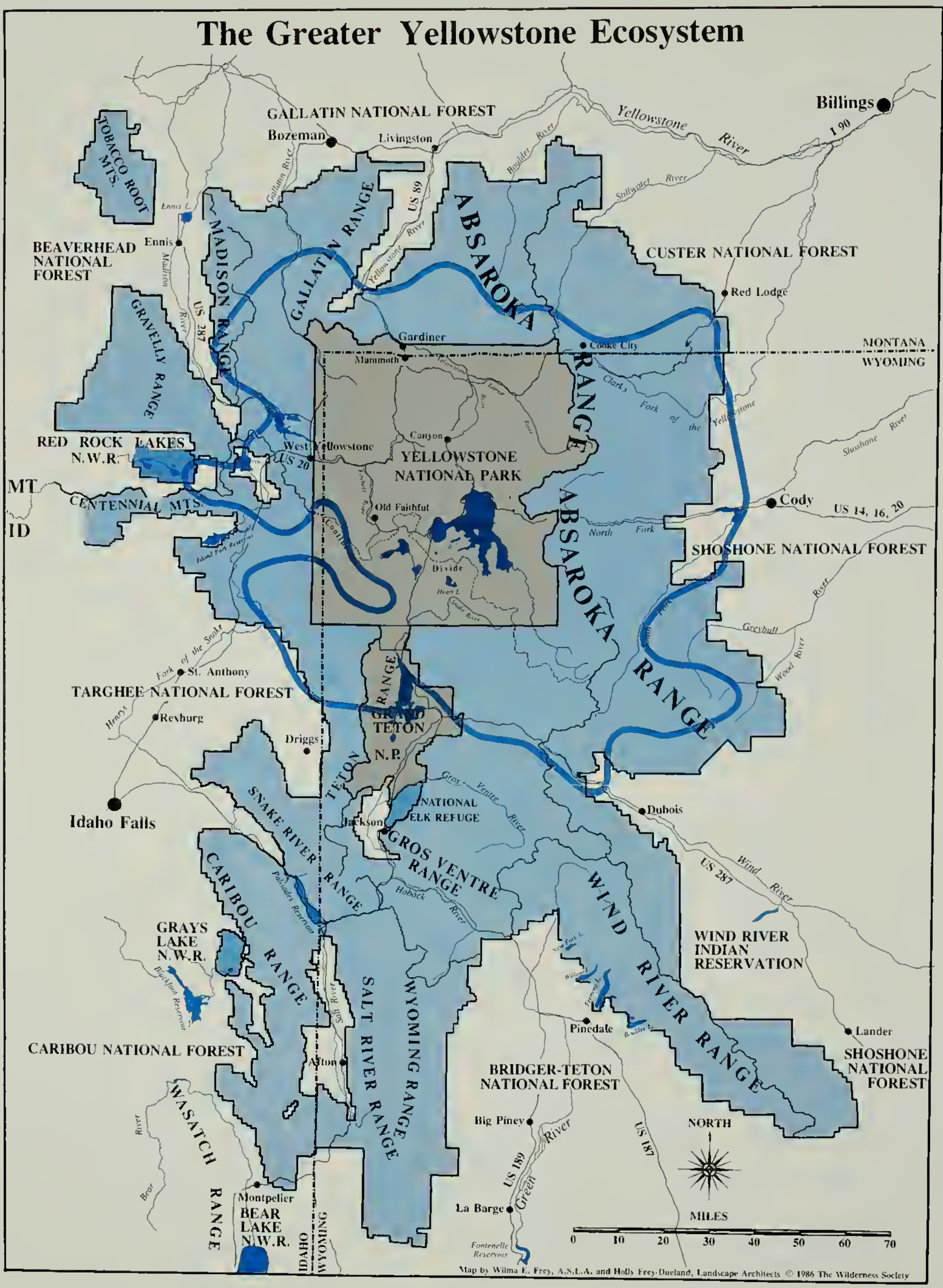
- National Parks, Elk Reserve, and Wilderness designated by Congress (USFS, BLM, and USF&WS)
- Wilderness study and special management areas

Unprotected Wild Lands:

- Roadless area inventoried by the Forest Service
- Roadless area inventoried by the Bureau of Land Management

Conservationist Proposals:

- Proposed Wilderness
- Linkage Area: Protection or restoration of area is needed to build the macroreserve.



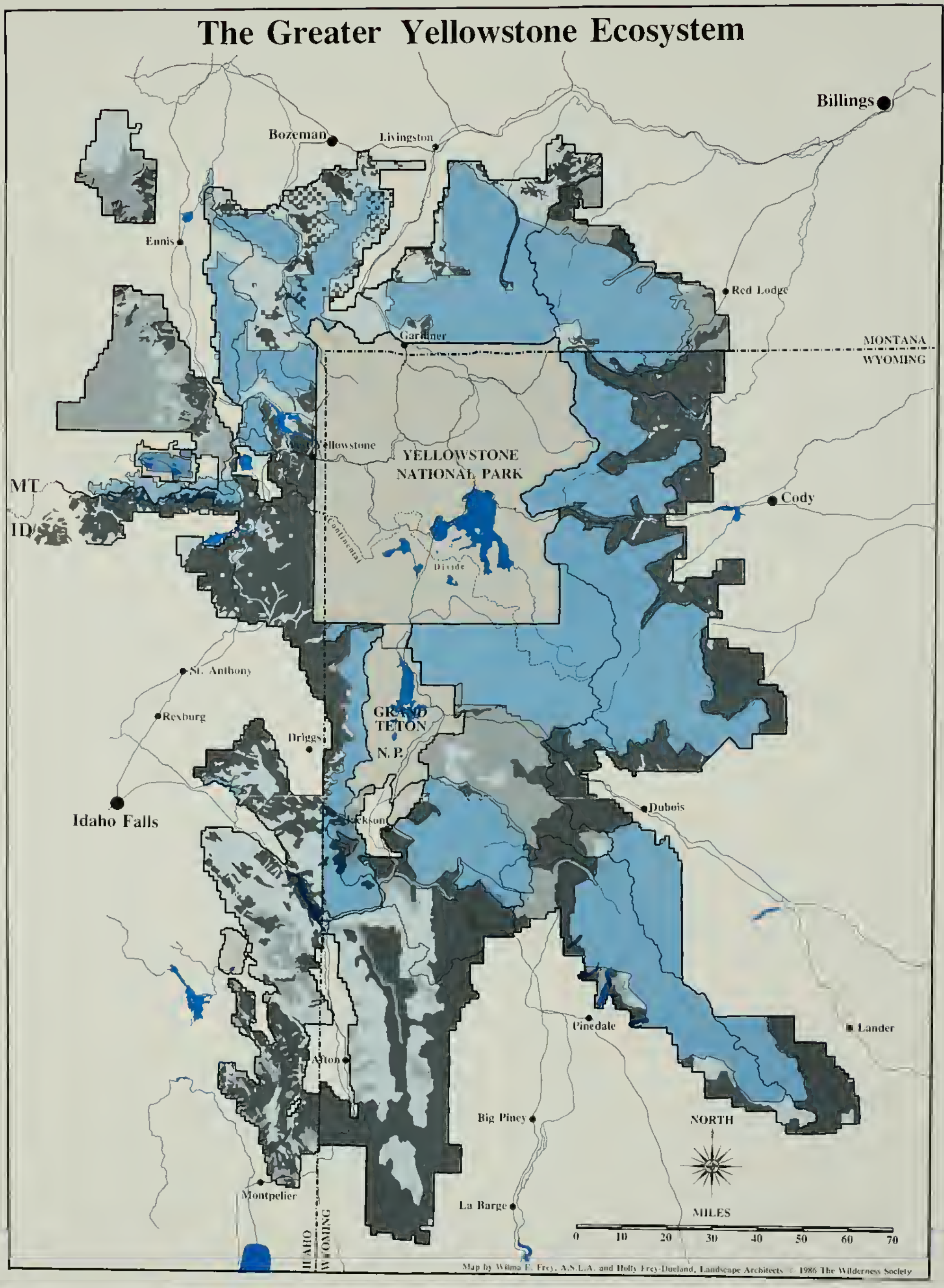
Map 3. Occupied Grizzly Bear Habitat in the Greater Yellowstone Ecosystem

National Forest System

National Park System

National Wildlife Refuge System

Occupied grizzly bear habitat (Source: Knight and Eberhardt, 1985)



Map 4. Planned Logging on National Forests in the Greater Yellowstone Ecosystem.

National park and wildlife refuge lands

National forest land permanently or temporarily protected from logging by statute: designated wilderness, wilderness study and special management areas

Planned long-term logging, 50-year plan (may contain inclusions of unsuitable timber land)

Planned long-term vegetation management/ non-scheduled sales, 50-year plan (may contain inclusions of unsuitable timber land)

Source: U.S. Forest Service

THE WILDERNESS SOCIETY